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Advanced Distributed Simulation Technology
Horizontal Integration Experiment

M1A2 / CVCC Translation Specification for the Inter-Vehicular Information System Translator (ITRANS)

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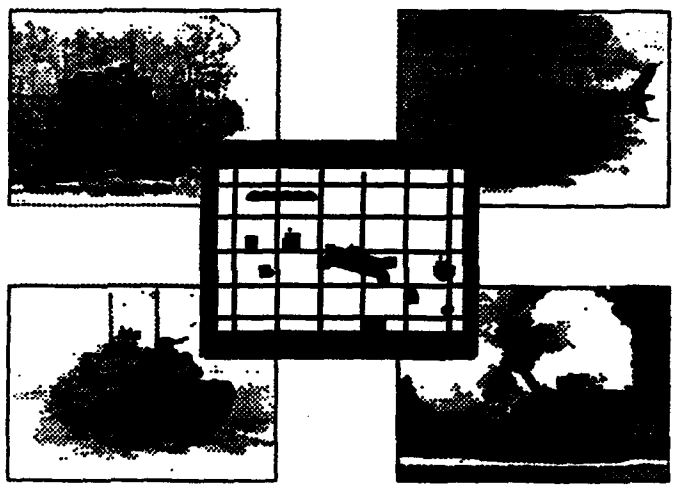

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13. ABSTRACT (Maximum 200 words)
The purpose of the Inter-Vehicular Information Systems Translator (ITRANS) is to provide seamless IVIS communication between the CVCC IVIS system and the M1A2 IVIS System. These systems are heterogeneous Command and Control systems that have been used in ADST simulation experiments. During the Horizontal Integration Experiment (Oct to Dec '93) interoperability between these two systems became a requirement. This document provides a user perspective on the translations performed by the ITRANS.

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1. General Issues

The purpose of the InterVehicular Information Systems Translator (ITRANS) is to provide seamless IVIS communication between the CVCC IVIS system and the M1A2 IVIS Systems. The M1A2 systems will not know if the vehicles it sees are M1A2 IVIS equipped or CVCC IVIS equipped and the CVCC systems will not know if the vehicles it sees are CVCC IVIS equipped or M1A2 IVIS equipped.

The ITRANS views the communication world with two types of networks: one for CVCC and one for M1A2. Each system will understand only one of the two types of report formats. The ITRANS represents the systems which are not on the same logical communication network, that is, it represents M1A2 systems on the CVCC network, and represents CVCC systems on the M1A2 network. Therefore, the ITRANS must provide all the status and handshaking data that a native system would.

This document provides a user perspective on the translations performed by the ITRANS.

Section 1 contains general overview information and describes handling of specific issues.

Section 2 contains the translations between reports.

Section 3 contains the translations between overlays.

Section 4 contains an explanation the translation table convention used in this document.

1.1. Call Signs

M1A2 call signs are five characters long with the format specified in the figure 1. CVCC call signs are not rigidly formatted. The conversions are described below.

Letter	Digit	Letter	Digit	Digit

Figure 1: M1A2 IVIS Call Sign Format

1.1.1 CVCC to M1A2 Call Sign Translation

When CVCC Status PDUs are received an M1A2 call sign is created for each vehicle which has not been mentioned in a previous Status PDU. Figure 2 shows the duty position dependent method that is used.

Duty Position		Call Sign				
		Letter	Digit*	Letter	Digit	Digit
Battalion	Commander	A	0..9	Y	0	6
	XO	A	0..9	Y	0	5
	FSO	A	0..9	Y	0	5
	S1	A	0..9	Y	0	5
	S2	A	0..9	Y	0	5
	S3	A	0..9	Y	0	5
	S4	A	0..9	Y	0	5
Company	Commander	A	0..9	Company	6	6
	XO	A	0..9	Company	0	5
Platoon	Leader	A	0..9	Company	Platoon	1
	Sergeant	A	0..9	Company	Platoon	4
	Wingman 1	A	0..9	Company	Platoon	2
	Wingman 2	A	0..9	Company	Platoon	3

Figure 2: CVCC to M1A2 Call Sign Creation

*The first digit of the call sign is created somewhat randomly by the following method: A counter is started at 0 each time a status PDU is received. For each new vehicle, the rightmost digit of this counter is used as this first digit of the call sign. If the call sign created has been used, the digit is incremented until a unique call sign is created.

1.1.2 CVCC to M1A2 Tank Number Creation

Each M1A2 system also has a unique tank ID. For the M1A2s, this is the password that was entered when the Commander's Integrated Display was powered on. For CVCC systems, this value is created by concatenating an M and a unique number. The unique number is simply a count of each CVCC vehicle encountered, padded with leading zeros to make it a 5 digit number.

1.1.3 M1A2 to CVCC Call Sign Translation

The native M1A2 IVIS call sign is used.

The M1A2 IVIS call sign is parsed to obtain echelon information. The M1A2 Simulator Systems do not transmit all of the echelon information that the tank commander has entered, but this information is required to uniquely identify an entity in an exercise for CVCC communications. Therefore, a convention was adopted which encodes this information in the call sign. In order for ITRANS to operate properly, the call signs selected must conform to the rules shown in figure 3. The question marks may be substituted with any letter or digit as specified. Figure 4 shows some sample call signs for specified duty positions.

Duty Position	Call Sign Format Requirement				
	Letter	Digit	Letter	Digit	Digit
Battalion	?	?	H	0-5 or 7-9	?
Platoon assigned to Battalion	?	?	H	6	?
Company	?	?	A-F	5-9	?
Platoon	?	?	A-F	1-4	?

Figure 3: Call Sign Assignment Convention for ITRANS

Duty Position	Sample Call Sign
Battalion Commander	M1H24
Scout Platoon Leader	M1H64
Company A Commander	M1A54
Company D, 4th Platoon Leader	M1D44

Figure 4: Sample Call Signs

1.2. Duty Positions

In some cases, CVCC and M1A2 duty positions do not directly match. The mapping from CVCC to M1A2 is shown in figure 5. Section 2.2 contains an explanation of the formatting convention used in figure 5.

CVCC Duty Position		M1A2 Duty Position	
Brigade	Commander	Undefined	
	XO	Undefined	
	FSO	Undefined	
	S1	Undefined	
	S2	Undefined	
	S3	Undefined	
	S4	Undefined	
Battalion	Commander	Battalion	Commander
	XO		XO
	FSO		FSO
	S2		S2
	S3		S3
	S4 S1		CTCP
	Sit Disp		Undefined
Company	Commander	Company	Commander
	XO		XO FIST 1st SGT
Platoon	Leader	Platoon	Leader Scout PL LDR Mortar PL LDR SPT PL LDR ADA CDR EGR CDR MED PL LDR UCMP CMBT SRV M BMO
	Sergeant		Sergeant
	Wingman 1		Wingman 1
	Wingman 2		Wingman 2

Figure 5: CVCC to M1A2 Duty Position Conversion

1.3. Position Reports

The CVCC systems use database coordinates to communicate vehicle positions, whereas the M1A2 uses MGRS world coordinates. The database coordinates are used to create a UTM location. This UTM location is converted to an MGRS location by adding a spheroid and grid zone designator (two digits and a letter).

The spheroid and grid zone designator are stored in the configuration file (discussed in section 1.5). This method of location conversion is not completely accurate but has been shown to be adequate in experiments.

The ITRANS system ensures that position reports are sent to M1A2 systems for each CVCC system on the network. ITRANS watches the movement of each CVCC vehicle and keeps a timer for each so that it may send position reports every 15 minutes or 100 meters of vehicle movement.

The CVCC systems expect to receive status updates every 5 seconds from every vehicle on the network. The ITRANS ensures that these are sent out for the M1A2 vehicles. These status updates include position information. The position information is based on the database coordinates of the vehicle on the simulated battlefield. The CVCC systems are not sent M1A2 position reports, nor are they given any position data transmitted in those reports.

CVCC systems see all vehicles in an exercise. This is accomplished by forwarding the status reports (including position) up and down the command chain. This is contrary to the M1A2 approach where only vehicles on a particular command networks are visible. Again, ITRANS provides seamless communication: the CVCC systems are told all vehicle locations and the M1A2 systems are told only the positions of vehicles on their command networks.

1.4 Report Routing

In the CVCC world all reports are broadcast on a communication network. Each level of command is assigned its own command network, and all reports are received by every system on that network. Instead, the M1A2 system routes most reports based upon their type and the duty positions of the sender and receivers. A few report types specify broadcast sending, instead of the point to point report routing. When a report is broadcast, all simulators in which the radios are set to the parameters of the source will receive the report.

To maintain the seamless communication between these systems reports sent on the M1A2 network are directed according to the routing tables and reports sent on the CVCC network are broadcast on a command network.

1.5 Configuration File

The configuration file is divided up into four parts: the location of the exercise, the mapping of radio parameters to each CVCC command network, the M1A2 routing tables, and preloaded CVCC vehicles. An overview of each part is provided below.

1.4.1 Exercise Location

As described in section 1.3 Position Reports, the spheroid and grid zone designator that are used in the conversion from UTM to MGRS are stored in the configuration file.

1.4.2 Radio Parameters to CVCC Command Network Mapping

The M1A2 systems use radio settings to establish the command networks, whereas the CVCC systems use echelon information to establish or define the command networks. The radio parameter to CVCC command network mapping includes an entry for every command network that is to be used in an exercise. This entry identifies both the echelon and the radio settings for the command network.

For example, the A Company, 2nd Platoon command network might use radio A, channel 2, frequency hopping, 4800 data rate, COMSEC variable 1, plain text, and have time delay off. The configuration file entry for this network would look like the following:

```
radio    A     2     FH    4800  1     PT    Off
net      Bn 1  Co A  Plt 2 Inf
```

1.4.3 Routing Tables

The routing tables are read from the configuration file. Each report has its own entry. This entry may specify broadcast or a table of duty positions. The table of duty positions has the following format:

```
route   route-table-name (
                sender ( primary primary ... )
                        ( alternate alternate ... )
                sender ( primary primary ... )
                        ( alternate alternate ... )
                        )
```

Where the route-table-name may be any one of
contact, spot, cff, sit, overlay_ops, overlay_enemy, overlay_fso, overlay_ops1*

* The overlay_ops routing table is used for both the obstacle and the operations 1 overlays. The overlay_ops1 is used for the operations 2 overlay. This is confusing and should probably be changed.

The sender, primary, and alternate are duty positions, which may be any one of
BnCO, BnXO, BnS4, BnS3, BnS3TOC, BnS2, BnS1, BnFSO
CoCO, CoXO, Co1SG, CoFist
PL, PS, PW1, PW2
SctPL, MortPL, EngCO, AdaPL, SptPL, MedPL, UMCP, BMO, CSM

When a report is to be routed the duty position of the sender is looked up in the routing table specified by the type of the report. This lookup yields two lists: a list of primary receivers and a list of alternate receivers. Anyone currently on the command network whose duty position is in the list of primary destinations will receive the report. If there are no primary receivers of a report, the alternate list is checked in the same way.

1.4.4 Preloaded CVCC Vehicles

Several of the Battalion TOC positions do not have vehicle simulations. Therefore, status messages are not sent for these positions. The ITRANS does not see these entities so they are preloaded into ITRANS. The battalion S2 entry would look like the following:

```
cvcc_vehicle    BnS2
cvcc_network    Bn 1 Irr Irr Irr Irr
```

2. Reports

The reports from both the CVCC and M1A2 systems are shown in figure 6. The translation and direction of translation is shown in the center column. The Call For Fire, Contact, Situation, and Spot are translated in both directions. The Adjust Fire is translated in to an M1A2 Call For Fire Report, but an Adjust Fire can not be initiated from the M1A2 side of the ITRANS. The other reports are not translated.

CVCC Report	Translation	M1A2 IVIS Report
Adjust Fire	->	Call For Fire
Call For Fire	<->	Call For Fire
Contact	<->	Contact
Shell	none	
Situation	<->	Situation
Spot	<->	Spot
Intel	none	
Free Text	none	
NBC	none	
	none	MedEvac Air
	none	MedEvac Ground

Figure 6: CVCC to M1A2 IVIS Report Mapping

An M1A2 IVIS Contact or Spot report may have a Call For Fire report appended to it. When this occurs, the ITRANS generates a CVCC Contact or Spot report and an additional CVCC Call For Fire report.

2.1 Report Field Translations

The sections and tables below show the translation between M1A2 and CVCC report formats. The leftmost column contains the M1A2 report fields. The rightmost column contains the CVCC report fields. If fields from each of the two reports are on the same line of a table, there is a translation between them. In such cases, the middle column or columns describe the translation. If a report field does not have a corresponding field in the other format, the field will be on a line by itself. In these cases, the middle column describes how the field is filled in. Section 2.2 contains the translations referenced in the middle columns.

2.1.1. Call For Fire Report

M1A2 Report Field	M1A2<-CVCC	M1A2->CVCC	CVCC Report Field
Time	System Time Stamp		Time
Location			Target Location
		Sender's Location is Copied from the Status PDUs	Observer Location
Type	See Object Type Detailed Translation	See Threat Type Translation	Type
Size			Size
		Not Filled	Concentration Number
Fire Type	"Immediate Suppression"		

Figure 7: Call For Fire Report Translation

The adjust fire report is translated into an M1A2 call for fire report. The new location is transmitted and the threat type is specified as none.

An adjust fire message can not be sent from an M1A2 system to a CVCC system.

2.1.2. Contact Report

M1A2 Report Field	M1A2<-CVCC	M1A2->CVCC	CVCC Report Field
Time	System Time Stamp		Time
Location			Location
		Not Filled	Heading
Type	See Threat Type Translation [1 of 2 translated]		Type [2]
Size	1		
Fire	"None"		

Figure 8: Contact Report Translation

2.1.3. Situation Report

M1A2 Report Field	M1A2<-CVCC	M1A2->CVCC	CVCC Report Field
Time	System Time Stamp		Time
Enemy Activity	See Enemy Activity Translation		Enemy Activity Type
		Not Filled	Enemy Activity Level
Friendly Locations [9]	From Status PDUs		
		From Friendly Locations	Start FLOT
		From Friendly Locations	End FLOT
Tactical	See Tactical Translation		Own Intent
Vehicles Authorized	Not Filled		
Vehicles On Hand	Not Filled		
Personnel Authorized	Not Filled		
Personnel On Hand	From Status PDUs		
SABOT	From Status PDUs		
HEAT	From Status PDUs		
MPAT	Not Filled		
STAFF	Not Filled		
Smoke Grenade	Not Filled		
COAX	From Status PDUs		
50 Caliber	Not Filled		
Fuel	From Status PDUs, See Figure 10		
		Not Filled	Critical Shortage Ammo
		Not Filled	Critical Shortage Equipment
		Not Filled	Critical Shortage Fuel

Figure 9: Situation Report Translation

Fuel Level	Status Code
0-25%	Red
25-50%	Green
50-75%	Amber
75-100%	Black

Figure 10: Fuel Level Conversion

2.1.4. Spot Report

M1A2 Report Field	M1A2<-CVCC	M1A2->CVCC	CVCC Report Field
Time	System Time Stamp		Time
Location			Location
Type [4]	See Threat Type Translation [2 of 4 translated]		Type [2]
Size [4]	2 of 4 translated		Number [2]
		Not Filled	Damaged
		Not Filled	Destroyed
Fire Type	"None"		
Friendly Action	See Enemy Activity Translation		Enemy Activity
Activity	See Friendly Activity Translation		Own Activity

Figure 11: Spot Report Translation

2.2 Enumeration Type Translations

The following examples are given to clarify the translation tables presented below. Figure 12 shows a translation in which one M1A2 value is translated to one CVCC value, and the same CVCC value is translated back into an M1A2 value.

M1A2	CVCC
1	A

Figure 12: One to One Translation Table Entry

The M1A2 value 1 will be translated into CVCC A. 1 -> A
The CVCC value A will be translated into M1A2 1. A -> 1

Figure 13 shows a translation in which there are multiple CVCC values representing one M1A2 value. It is not possible to send B, C, D, or E from M1A2 to CVCC.

M1A2	CVCC
1	A
	B
	C
	D
	E

Figure 13: One to Many Translation Table Entry

The M1A2 value 1 will be translated into CVCC A. 1 -> A
The CVCC value A will be translated into M1A2 1. A -> 1
The CVCC value B will be translated into M1A2 1. B -> 1
The CVCC value C will be translated into M1A2 1. C -> 1
The CVCC value D will be translated into M1A2 1. D -> 1
The CVCC value E will be translated into M1A2 1. E -> 1

Figure 14 shows a translation in which there are multiple M1A2 values representing one CVCC value. It is not possible to send 2, 3, 4, or 5, from CVCC to M1A2.

M1A2	CVCC
1	A
2	
3	
4	
5	

Figure 14: Many to One Translation Table Entry

The M1A2 value 1 will be translated into CVCC A. 1 -> A
The M1A2 value 2 will be translated into CVCC A. 2 -> A
The M1A2 value 3 will be translated into CVCC A. 3 -> A
The M1A2 value 4 will be translated into CVCC A. 4 -> A
The M1A2 value 5 will be translated into CVCC A. 5 -> A
The CVCC value A will be translated into M1A2 1. A -> 1

2.3.1 Enemy Activity Translation

The enemy activity translation is used in the Situation and Spot reports for both CVCC and M1A2. Figure 15 shows the mapping between the two enumerations.

M1A2 Enemy Activity	CVCC Activity
None	Unknown
	No Change
Defending	Defend
Attacking	Attack
	Air Attack
	Fire
	Ground Attack
Withdrawing	Withdraw
Screening	Delay
Reconing	Recon

Figure 15: Enemy Activity Translation

2.3.2 Tactical Translation

The tactical translation is used in the Situation report for both CVCC and M1A2. Figure 16 shows the mapping between the two enumerations.

M1A2 Tactical	CVCC Activity
None	Unknown
	No Change
Defend	Defend
Attack	Attack
	Air Attack
	Fire
	Ground Attack
Withdraw	Withdraw
Relief	Delay
Move	Recon

Figure 16: Tactical Translation

2.3.3 Friendly Activity Translation

The friendly activity translation is used in the Spot report for both CVCC and M1A2. Figure 17 shows the mapping between the two enumerations.

M1A2 Friendly Activity	CVCC Activity
None	*see note below
	Unknown
Continue	No Change
	Air Attack
	Attack
	Fire
	Ground Attack
	Defend
	Delay
	Withdraw
Observe	Recon

Figure 17: Friendly Activity Translation

* The M1A2 "None" is translated to the CVCC "No Change",
  The CVCC "Unknown" is translated to the M1A2 "None",

2.3.4 Threat Type Translation

Threat types are specified in three reports: Contact, Call For Fire, and Spot. Several different translations are required because of the level of detail allowed in each. Figure 18 is used in creating all three CVCC reports from M1A2 reports. Figure 19 defines the translation used in creating M1A2 Contact reports from CVCC reports. Figure 20 defines the translation used in creating M1A2 Call For Fire and Spot reports from CVCC reports.

M1A2 Threat Type	CVCC Object Type
None	Unknown
Aircraft	Fix Wing Aircraft
Aircraft Flogger	
Aircraft Havoc	Helicopter
Aircraft Hind	
Aircraft Hip	
Artillery	Artillery
Artillery SP	
Artillery Towed	
APC	Personnel Carrier
APC BMP	
APC BDRM	
APC BTR	
Tank	Tank
Tank T55	
Tank T60	
Tank T72	
Tank T80	
Tank NATO	
Tank FST 1	Truck
Tank FST 2	
Other	Unknown
Other Bunker	
Other ZSU23	Truck
Other SA9 13	
Other Infantry	Troop

Figure 18: M1A2 Threat Type to CVCC Object Type Mapping

CVCC Object Type	M1A2 Threat Type
Unknown	None
Fix Wing Aircraft	Aircraft
Helicopter	
Artillery	Artillery
Mortar	
Personnel Carrier	APC
Truck	
C2	
Mech	
Scout	
Support	
Tank	Tank
ATGM	Other
Troop	
Unknown Obstacle	
Abati Obstacle	
Blown Bridge Obstacle	
Mine Field Obstacle	
Tank Ditch	
Nuclear Attack	
Biological Attack	
Chemical Attack	
NBC Observe Location	
Artillery Shell	
FLOT	

Figure 19: CVCC Object Type Mapping to M1A2 Threat Type

CVCC Object Type	M1A2 Threat Type
Unknown	None
Fix Wing Aircraft	Aircraft Flogger
Helicopter	Aircraft Hind
Artillery	Artillery
Mortar	
Personnel Carrier	APC BMP
Truck	APC
C2	
Mech	
Scout	
Support	
Friendly Tank	Tank NATO
Target Tank	Tank T72
Troop	Other Infantry
ATGM	Other
Unknown Obstacle	
Abati Obstacle	
Blown Bridge Obstacle	
Mine Field Obstacle	
Tank Ditch	
Nuclear Attack	
Biological Attack	
Chemical Attack	
NBC Observe Location	
Artillery Shell	
FLOT	

Figure 20: CVCC Object Type Mapping to M1A2 Detailed Threat Type

3. Overlays

The CVCC Battalion TOC workstation does not receive overlays from the simulation network. Therefore, CVCC overlays are translated into M1A2 overlays, but M1A2 overlays are not translated into CVCC overlays.

3.1 Overlay Types

CVCC systems not classify overlays into types; the M1A2 IVIS systems allow five overlay types. The name of a CVCC overlay is used to determine which M1A2 overlay type to generate. Figure 21 shows the five M1A2 overlay types and the character string which must appear in a CVCC overlay name for it to be translated properly to M1A2.

Overlay Type	CVCC Name
Enemy	ENEMY
Obstacle	OBST
Fire Support	FIRESPT
Operations 1	OPS1
Operations 2	OPS2

Figure 21: M1A2 Overlay Types and CVCC Naming Convention

3.2 Overlay Updates

CVCC systems do not send overlay updates, as the M1A2 systems do. To support this capability the ITRANS will maintain a copy of each overlay translated from CVCC to M1A2. When another overlay of the same type is to be transmitted it will be tagged as an update. The ITRANS will ensure that the M1A2 systems see the overlay as an accurate overlay update.

To send a full overlay (possibly after updates have been sent) the TOC operators must simply create a new overlay. The TOC will give it a new overlay ID and this will tell ITRANS to send out a full overlay.

3.3 Graphic Element Translations

Translation of overlays is accomplished by translating each graphic in an overlay from the CVCC type and format to the M1A2 type and format. Two goals were attempted when mapping the graphics from CVCC to M1A2. First, make the graphics look the same whenever possible. Second, provide a means to create all M1A2 graphics from the CVCC Battalion TOC.

In the M1A2, waypoints (start, passage, coordinating, release, etc.) may be numbered to assist with navigation of the tank. These numbered waypoints may be sent in an overlay. The ITRANS system does not provide a means to generate numbered waypoints for sending to the M1A2 systems. The points themselves may be sent, but it is the responsibility of the tank commander to number the points, if he wishes to use them as waypoints.

The CVCC and M1A2 systems use a type, one or more labels, and a series of points to define each graphic.

Each M1A2 graphic may have up to two labels of ten characters each. The labels are attached to the left and right sides or endpoints of the graphic. The CVCC graphics have a variable number of labels depending on the type of the graphic. The first two labels are translated into the M1A2 labels. If two or fewer labels are used on each graphic, the translation to M1A2 will be consistent.

Each graphic represents either a point, line, or area which is defined by its type. The translation of graphics is discussed in the following sections.

3.3.1 Graphic Point Translations

Figure 22 shows the point type translations.

The point obstacle is used as the default for any graphics which do not have a translation.

All four CVCC TOC symbols are translated to the generic M1A2 headquarters symbol.

In order to create a tank or armored personnel carrier (APC), the appropriate unit symbol with no size designator should be used.

CVCC does not support the Anti-tank Weapon icon, therefore the Anti-armor icon is translated into the Anti-tank Weapon icon.

Finally, two M1A2 graphics cannot be created from the Battalion TOC: threat and medevac. These two graphics are automatically added to overlays when the tank receives a report. The location from a contact, spot, or call for fire report is noted with the threat icon on the enemy overlay and the location from a medevac report is noted with the medevac icon on the first operations overlay.

CVCC	M1A2
Check Point	Critical Point
Linkup Point	
Departure Point	
Traffic Control Point	
Way Point	
Start Point	Start Point
Release Point	Release Point
Coordinating Point	Coordinating Point
Contact Point	Contact Point
Passage Point	Passage Point
Mortar Range Fan	Target Reference Point
Howitzer Range Fan	
Target Reference Point	
Observation Post	Observation Point
Antitank Mine	Anti Personnel Minefield
Antipersonnel Mine	
Mine	
Anti Armor	Anti Tank Weapon
IVIS ATGM	
IVIS PC	APC
IVIS Scout	
BIFV	
CFV	
IVIS Troop	Armor Cavalry Troop
IVIS Tank	Tank
Tank Image	
Heavy Tank	
Armor Bn TOC	Headquarters
Cavalry Squadron TOC	
Infantry TOC	
Mech TOC	
Armor Or Armored Airborne	
Battalion	Armor Battalion
Company	Armor Company
Platoon	Armor Platoon
Task Force	Armor Task Force
Team	Armor Team
Default	Tank
Armored Cavalry	
Squadron	Armor Cavalry Squadron
Battalion	
Company	
Task Force	
Team	
Platoon	Armor Cavalry Platoon
Default	APC

Figure 22: CVCC - M1A2 Point Translation

CVCC	M1A2
Cavalry Or Mech Infantry Or Motorized Infantry Or BIFV Mounted Or Infantry	
Battalion	Mech Infantry Battalion
Company	Mech Infantry Company
Platoon	Mech Infantry Platoon
Task Force	Mech Infantry Task Force
Team	Mech Infantry Team
Default	APC
Abatis	Point Obstacle
IVIS Blown Bridge	
IVIS Abatis	
IVIS Unknown Observation	
ACP	
IVIS Unknown	
IVIS Mortar	
Mortar	
Howitzer	
IVIS Chemical	
IVIS Nuclear	
IVIS Fwair	
IVIS Helo	
IVIS Mech	
IVIS Observer Location	
IVIS Support	
IVIS Truck	
Air Cavalry	
Light Infantry	
Ranger	
Airborne Infantry	
Artillery	
Rocket Artillery	
Surface To Surface	
Howitzer Support	
203mm Howitzer Support	
Target Acquisition	
Engineer	
Bridging	
Topographic Engineer	
Amphibious Engineer	
Survey	
Air Defense	
Surface To Air	
Surface To Air Support	
Helicopter	
Fixed Wing	
Armor Trains	
Mech Trains	

Figure 22: CVCC - M1A2 Point Translation (continued)

CVCC	M1A2
Ammo Supply Point	Point Obstacle (continued)
ALOC	
Signal	
Medical	
Military Police	
CEWI	
IVIS Arty	
IVIS Biological	
Chemical	
Fired Demo	
Mortar Barrage	
Howitzer Barrage	
Nuclear Target	
IVIS Shell	
Helo	

Figure 22: CVCC - M1A2 Point Translation (continued)

3.3.2 Graphic Line Translations

Figure 23 shows the linear graphic translations.

The CVCC multi-point symbols may contain up to 50 points each. When these graphics are translated into equivalent M1A2 graphics, only nine points per symbol are translated.

The M1A2 does not support arrow objects, therefore any CVCC graphics containing arrows (axis of advance, direction of attack, main advance, etc.) are translated into one or more Free Draw symbols which replicate the graphic symbol on the TOC.

The CVCC Linear Target is a multi-point symbol, while the M1A2 Linear Concentration is a two-point symbol. Therefore, the CVCC Linear Target symbol is translated into one or more M1A2 Linear Concentration symbols.

The M1A2 does not support the Coordinated Fire Line, however since it does support the Front Line and Coordinating Point symbols, the CVCC Coordinated Fire Line is translated into two M1A2 Coordinating Points connected by one or more Front Line symbols.

The unspecified obstacle, bridge, and lane graphics cannot be created from the Battalion TOC.

CVCC	M1A2
No Fire Line	Free Draw
Generic Line	
Restricted Fire Line	
Direction Of Advance	
Main Direction Of Advance	
Axis Of Advance	
Main Axis Of Advance	
Boundary Line	
Phase Line	
Generic Area	
Linear Abatis	
Rectangular Target	Engagement Area
Linear Target	Linear Concentration
Unspecified Minefield	Minefield
Anti-tank Minefield	
Antipersonnel Minefield	
Tank Ditch	Anti-tank Ditch
Coordinated Fire Line	Coordinating Points and Front Line
FLOT	Front Line

Figure 23: CVCC - M1A2 Graphic Line Translation

3.3.3 Graphic Area Translations

Figure 24 shows the area translations. CVCC uses spline curves to represent battle positions. M1A2 uses three points to define the size and direction of a battle position. Therefore, all spline curves with a platoon, company, or battalion size designator will be translated into the corresponding M1A2 Battle Position symbol. The point with the size indicator and the two points on either side of it are used to create the M1A2 graphic. If four points are used to define a battle position, the result of the translation to M1A2 is very accurate. If more points are used, the extras are ignored.

CVCC	M1A2 Area
Generic Area	Free Draw
No Fire Area	Free Draw
Spline Curves w/Platoon Indicator	Battle Position - Platoon
Spline Curves w/Company Indicator	Battle Position - Company
Spline Curves w/Battalion Indicator	Battle Position - Battalion

Figure 24: CVCC - M1A2 Graphic Area Translation